



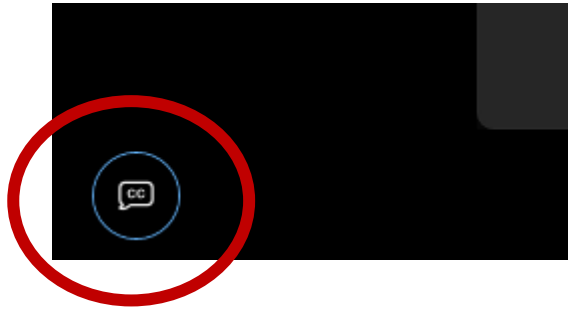
FMR Beginners Hands On

A hands-on introduction to Fusion Metadata Registry 11 (FMR)

BIS Monetary and Economic Department IT

House keeping

- The webinar will be recorded and shared on YouTube
- To turn on captioning, choose the 'CC' icon at the bottom left of the Webex window



- Please write questions in the Webex chat - there'll be a Q&A session at the end

Agenda

Introduction

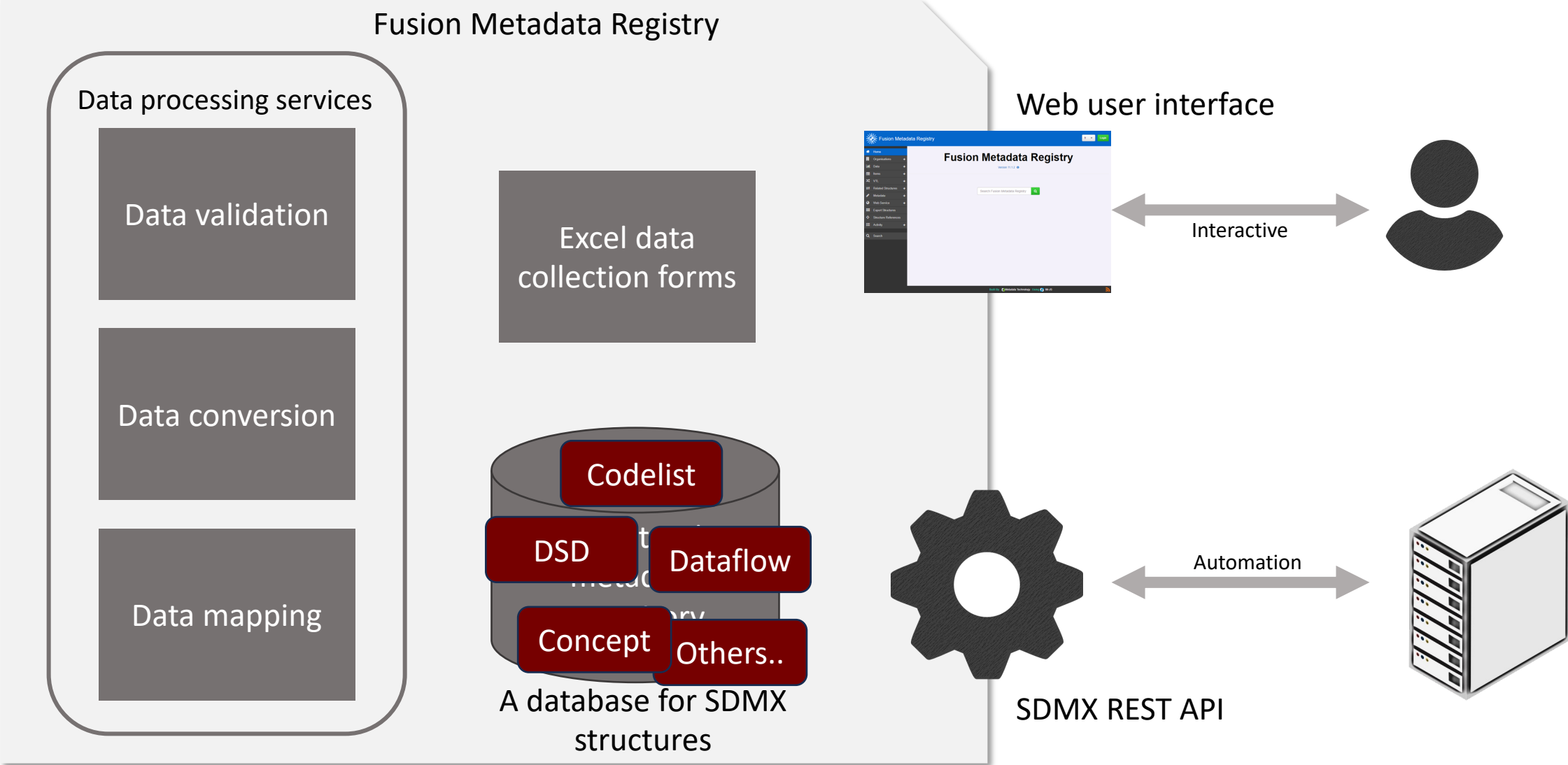
- What is Fusion Metadata Registry

Hands on

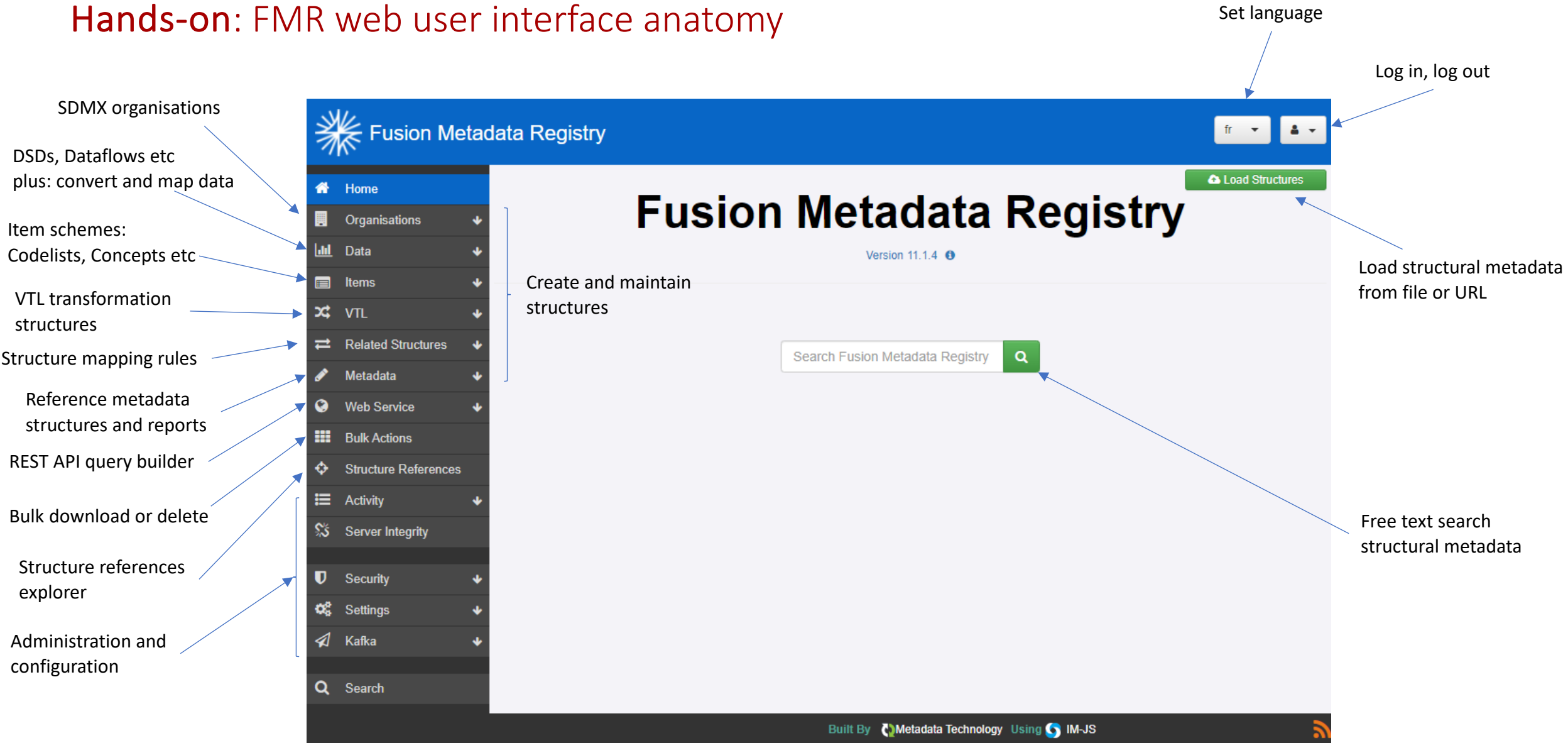
- Installation using Docker
- Maintaining the SDMX structures with the web user interface
- Working with data: validate, convert, map
- Using the SDMX REST API: a practical validation example using 'R'

Questions (15-20 mins)

What is Fusion Metadata Registry



Hands-on: FMR web user interface anatomy



What is Fusion Metadata Registry (FMR)

Wikipedia:

“A metadata registry is a central location in an organization where metadata definitions are stored and maintained in a controlled method.”

“Structural metadata registry to the SDMX specification”

All SDMX structures

e.g. Concepts, Codelists, Data Structure Definitions, Category Schemes, Structure Maps etc...

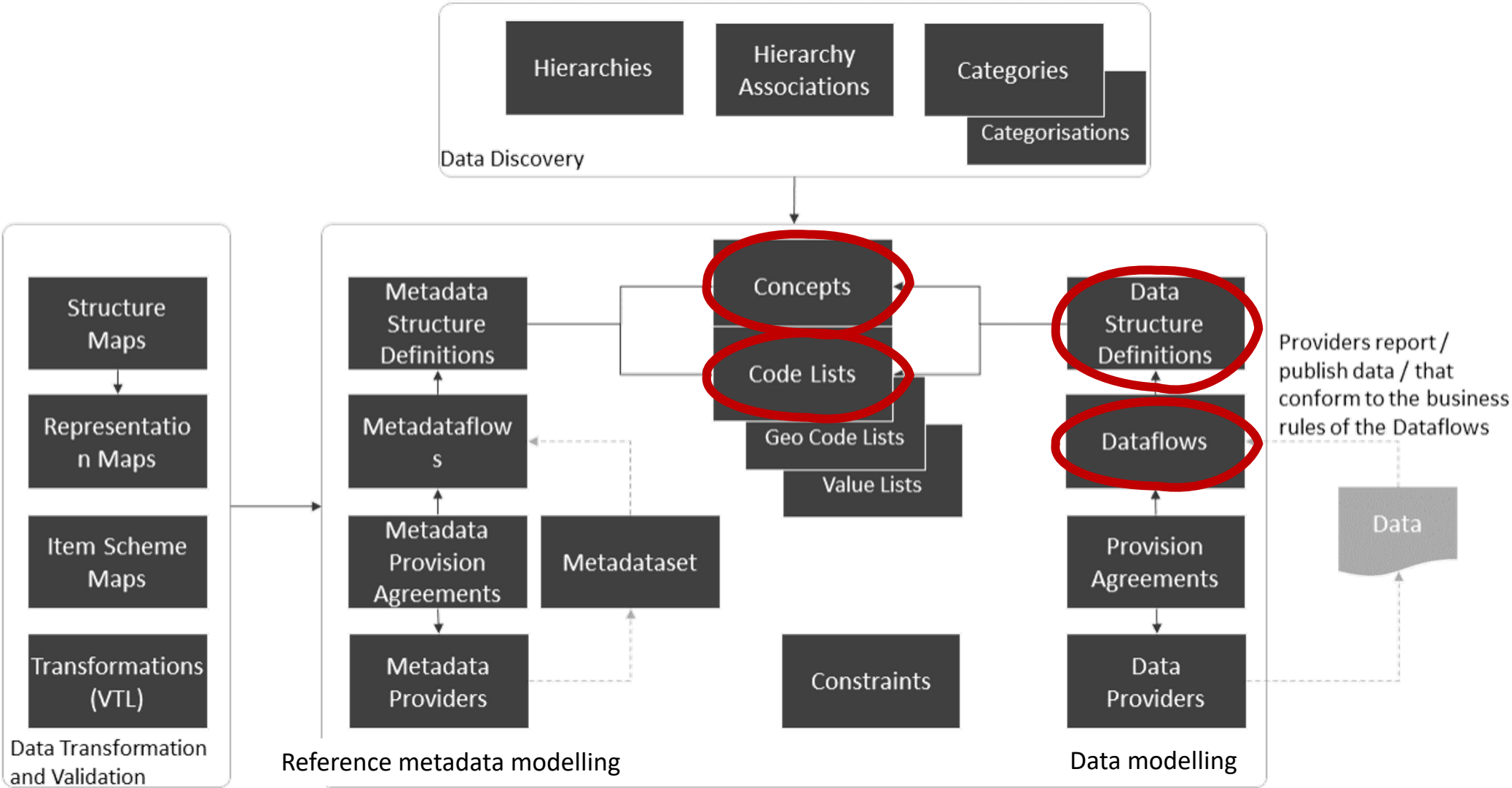
Plus: **reference metadata reports** which are treated like structures in SDMX 3.0

Uses the SDMX 3.0 ‘metamodel’

SDMX 2.1 model backward compatible

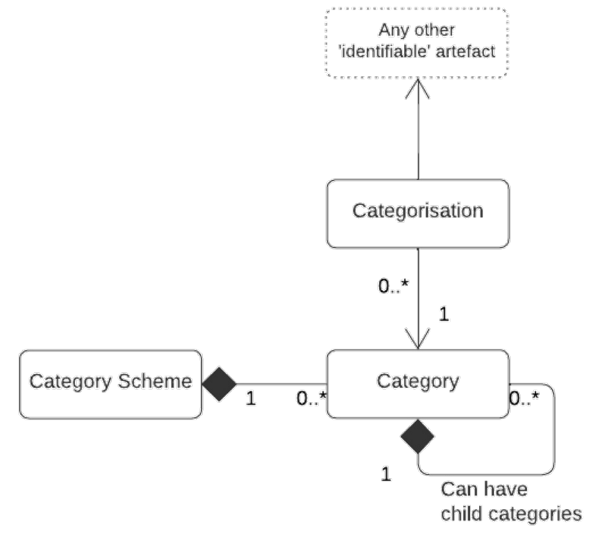
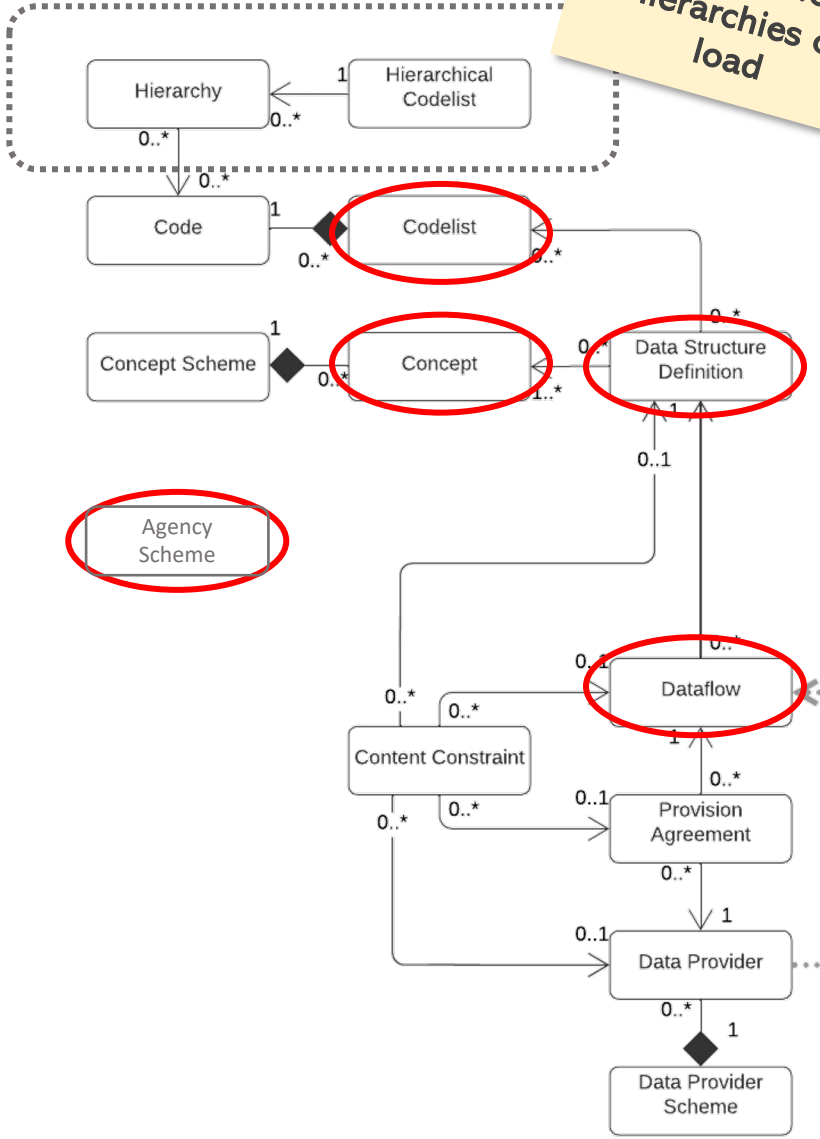
SDMX uses the term ‘information model’ rather than ‘metamodel’

FMR 11 uses the SDMX 3.0 metamodel (information model)

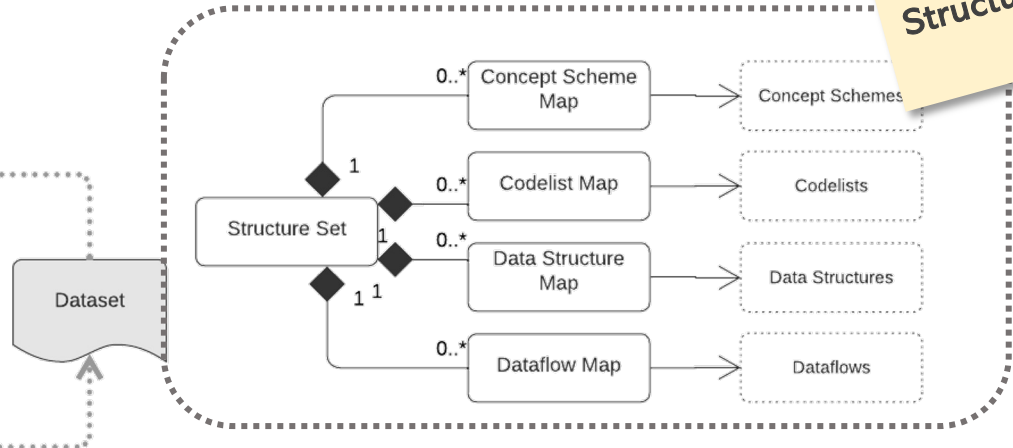


SDMX 2.1 metamodel suppo

HCLs are converted to SDMX 3.0 Hierarchies on load



Structure Sets are converted to SDMX 3.0 Structure Maps on load



(simplified)

Key FMR use cases

Centralised structural metadata registry

- Externalise and centralise metadata
- Metadata governance – gain control
- Improve metadata maintainability
- Metadata reuse
- Harmonisation of concepts

*Enables
'metadata-driven'
solutions*

Data collection

- Publish structural metadata for data reporters
- Generate Excel data reporting forms
- Validate received datasets

Data reporting

- Validate SDMX data prior to submission
- Convert data between SDMX formats
- Data mapping – transform data to the collector's DSD

SDMX structures authoring / maintenance

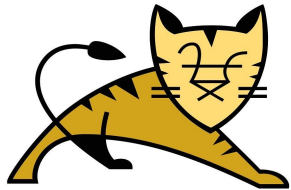
- Create and modify SDMX structures interactively using the web user interface

Installing FMR

FMR is a Java 'web application' that will run on Windows, Linux, Mac and other platforms

Option 1

Install on a Java **web application server**
like Apache Tomcat



Apache Tomcat



Production and enterprise deployments
Choose where more flexibility is required

Option 2

Run FMR in a '**container**'

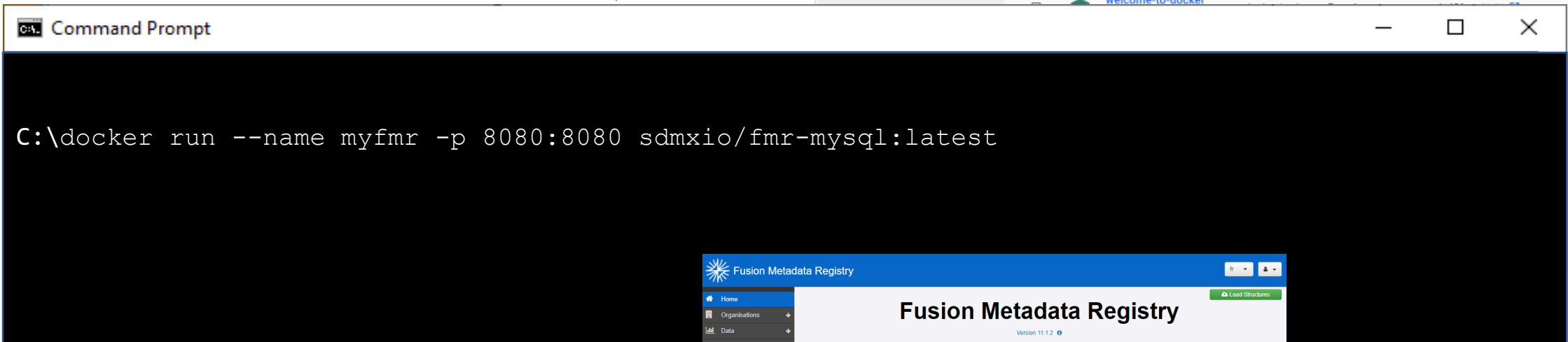
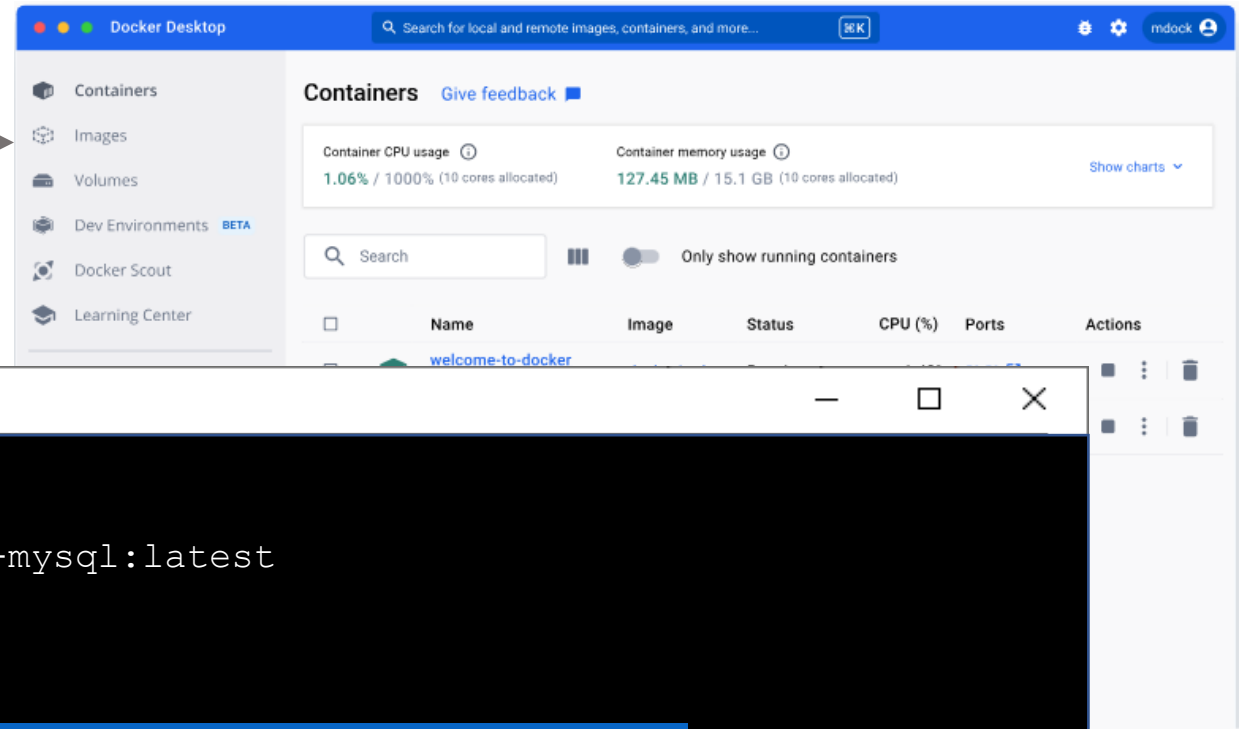


Personal, testing and light production workloads
Fast and simple to install

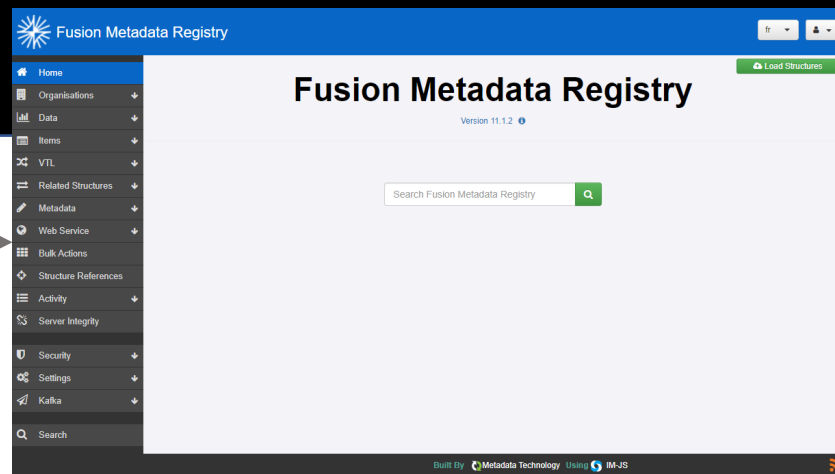
Hands-on: Run FMR using Docker

1. Install [Docker Desktop](#)

2. Create and start an FMR container



3. Browse to <http://localhost:8080>



More information on sdmx.io

Hands-on: maintaining structures with the FMR web user interface

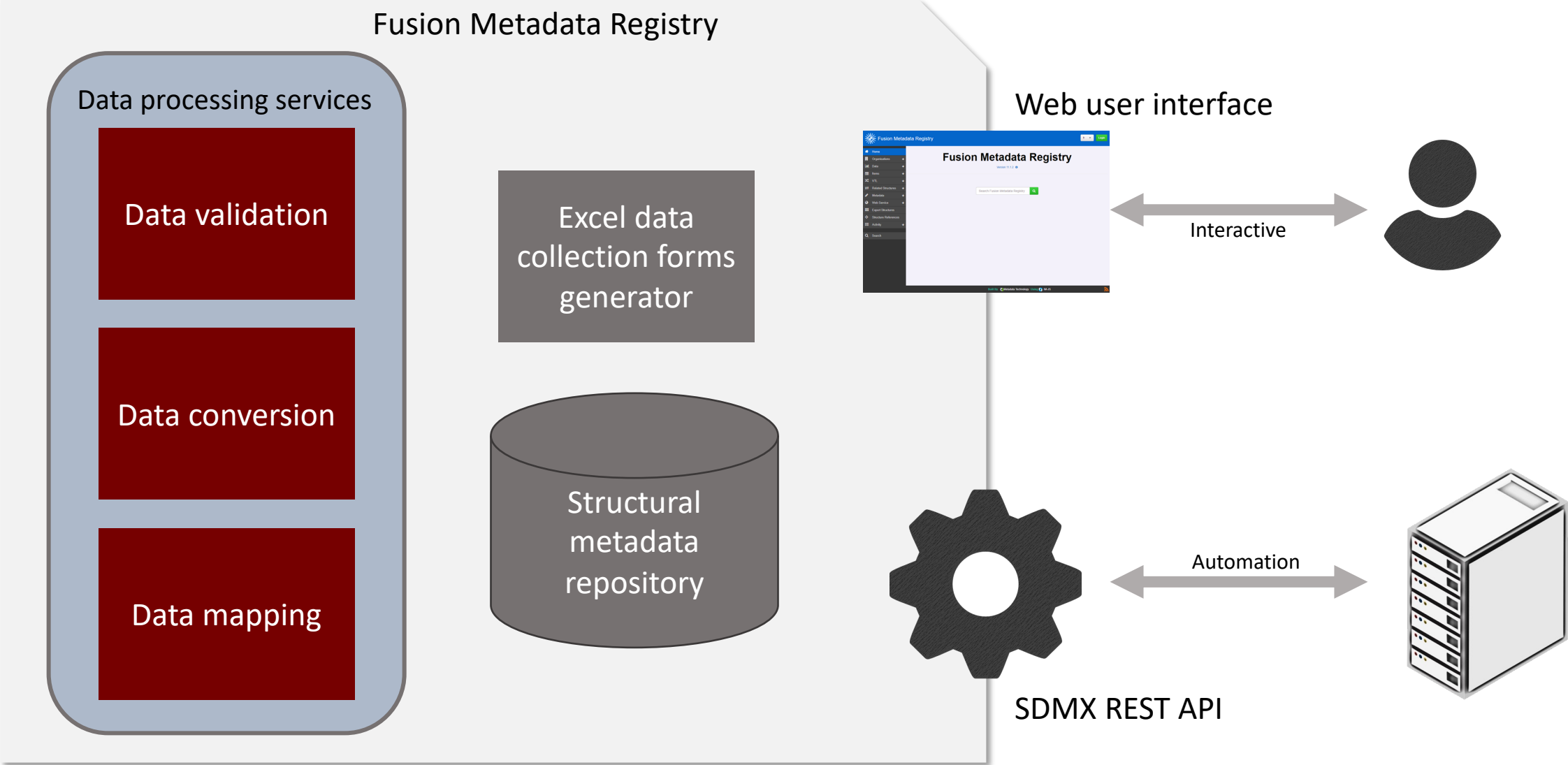
Core SDMX structures

- Agencies
- Concepts
- Codelists
- Data Structure Definitions
- Dataflows

The screenshot displays the Fusion Metadata Registry (FMR) web user interface. The top navigation bar includes the logo, the text "Fusion Metadata Registry", a language dropdown set to "fr", and a "Login" button. A left-hand sidebar contains a menu with categories: Home, Organisations, Data (selected), Data Definitions, Data Reporting, Convert Data, Items, VTL, Related Structures, Metadata, Web Service, Export Structures, and Structure References. The main content area is titled "Data Structure Definitions" and features a table with columns for "All" (dropdown), "Id", and "Name". The table lists six entries, with "ESTAT NA_MAIN NA Main Aggregates" highlighted in blue. Below the table, there is a search bar and a "Showing 1 to 6 of 6 entries" indicator. A "Data Structure Definition Details" section is visible, showing "Version: 1.9" and buttons for "References", "Changelog", "Export SDMX-ML 3.0", "Export Excel", "Compare", and "Structure Definition". A yellow sticky note with an upward-pointing arrow and the text "You can also use Excel" is overlaid on the "Export Excel" button.

All	Id	Name
ECB	ECB_EXR1	Exchange Rates
ECB	ECB_TRD1	External Trade
ESTAT	NA_MAIN	NA Main Aggregates
ESTAT	NA_SU	NA Supply/Use and Input/Output
WB	GCI	Global Competitiveness Index
WB	WDI	World Development Indicators

Working with data



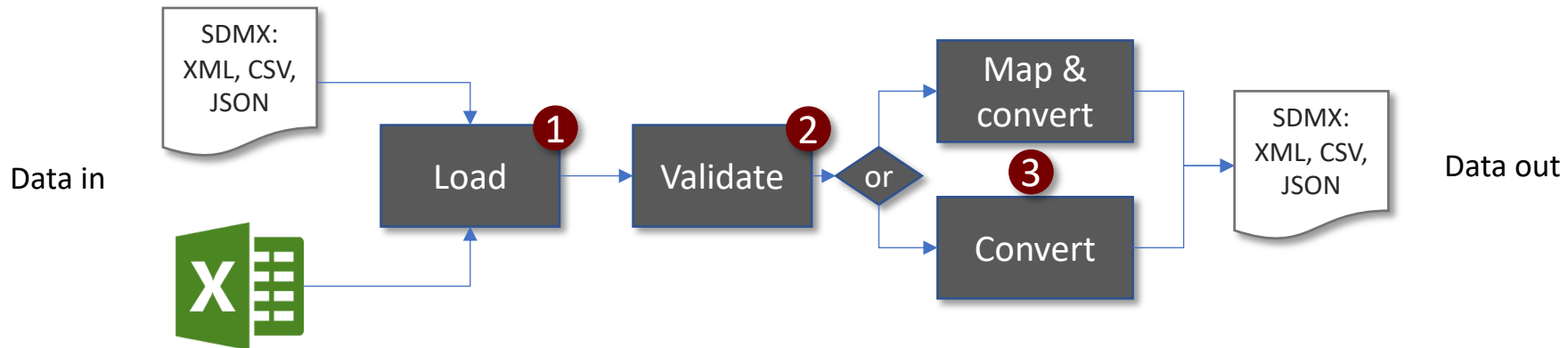
Hands-on: working with data – validate, map, convert

The first screenshot (1) shows the 'Fusion Metadata Registry' home page. The 'Data' menu is expanded, and the 'Convert Data' option is circled in red. The 'Data Set Details' section shows 'Data Source' as 'Load From File' and 'Data Format' as 'Auto Detect'. The 'Structure Details' section shows 'Data Structure' as 'Auto Detect'. The 'Data' section has a 'Data File' button and a 'Load Data' button.

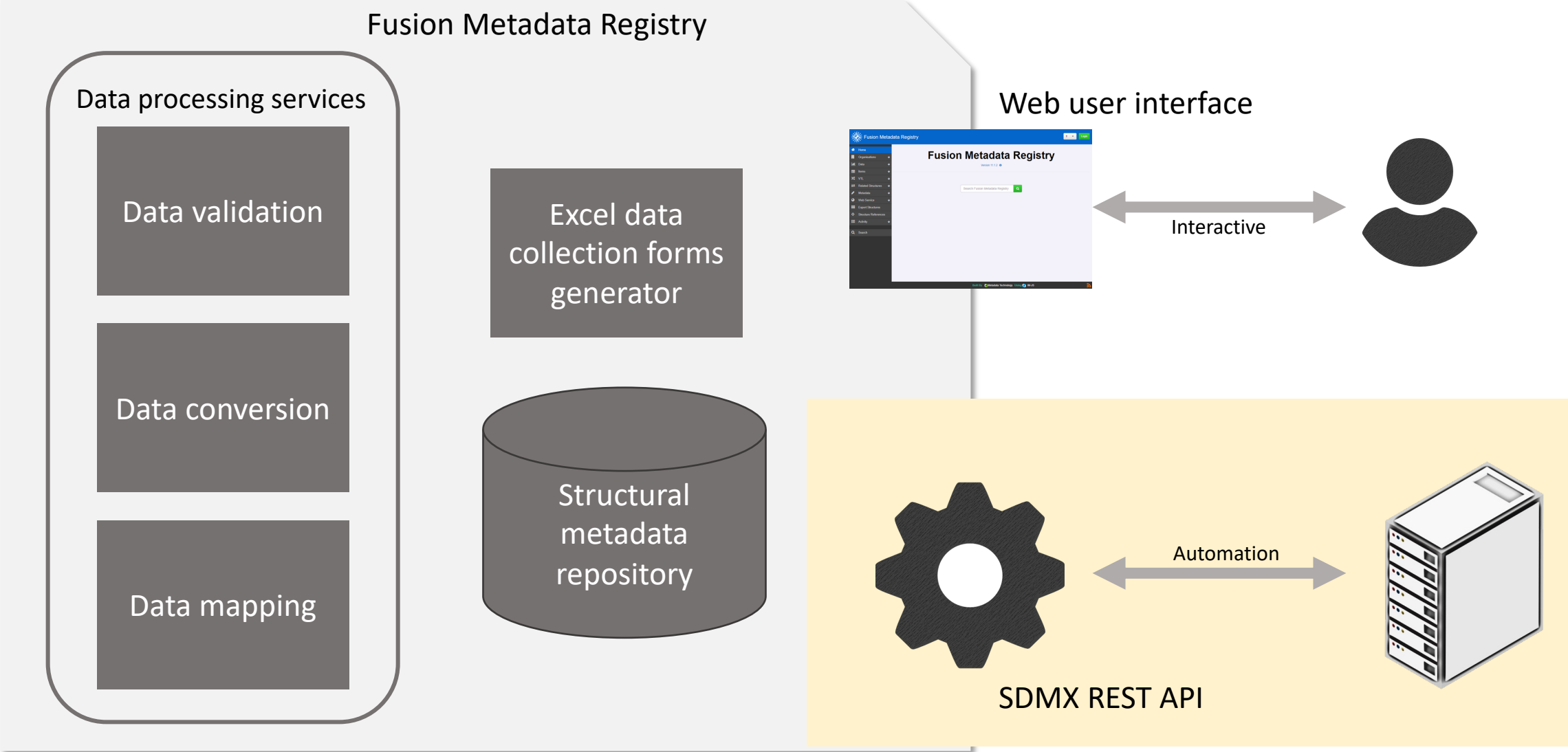
The second screenshot (2) shows the 'Dataset Details' page for 'mapping_data_invalid.csv'. The 'Convert Data' button is circled in red. The 'Action' section includes 'Load Data', 'Re-Verify Data', and 'Convert Data'. The 'Valid Structure' checkbox is checked.

The third screenshot (3) shows the 'Download Data' dialog box. The 'Map Data' dropdown is set to 'BIS:BIS_MACRO(1.0)'. The 'Data Format' dropdown is set to 'SDMX'. The 'Sub-Format' dropdown is set to 'v2.1 Structure Specific'. The 'Compression' dropdown is open, showing 'v2.1 Structure Specific' as the selected option. The 'Download' button is highlighted in green.

Disk file or URL



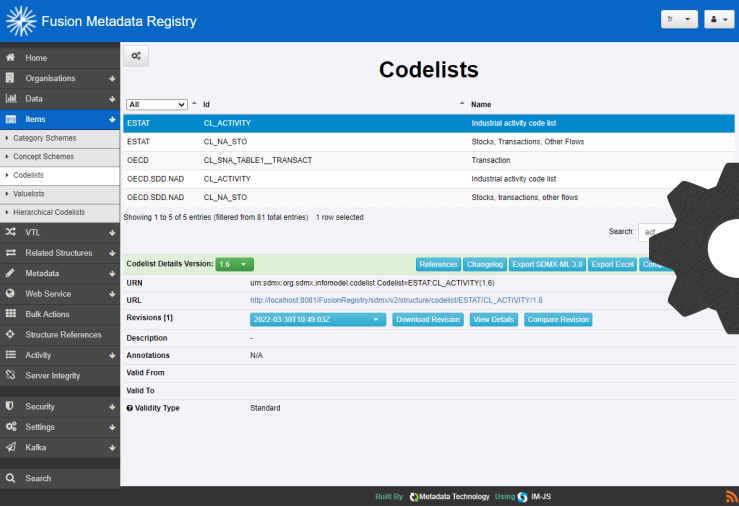
Using the REST API



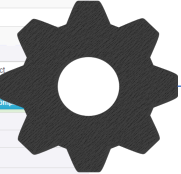
Hands-on: using the SDMX REST API

Practical example: metadata-driven data validation using R

Use case – validate variables in a CSV dataset against Codelists pulled from FMR’s SDMX REST API



Retrieve Codelist
from the FMR
SDMX REST API



R data
cleaning
code

CSV
dataset

Validation results

```
> summary(out)
name items passes fails nNA error warning
1 V1 6 6 0 0 FALSE FALSE
2 V2 6 5 1 0 FALSE TRUE

1
2 activity %vin% sdmx_codelist(endpoint = "http://
>
> violating(activity,rules)
activity obs_value
6 XXX 5
>
```

Reference:

MPJ van der Loo (2022) *The Data Validation Cookbook* version 1.1.0. <https://data-cleaning.github.io/validate>

Hands-on: using the SDMX REST API

Practical example: metadata-driven data validation using R

```
install.packages("rsdmx")  
install.packages("validate")  
library(rsdmx)  
library(validate)
```

Read the data to validate from a CSV file into a data frame.
The data does not have to be in SDMX format.

```
dataset <- read.csv("mydata.csv")  
rules <- validator(obs_value > 0  
  , activity %in% sdmx_codelist(endpoint = http://localhost:8080/ws/public/sdmxapi/rest  
  , agency_id = "ESTAT"  
  , resource_id = "CL_ACTIVITY"))  
out <- confront(dataset,rules)  
summary(out)  
violating(dataset,rules)
```

This rule tests whether the 'activity' variable in our dataset complies with the ESTAT:CL_ACTIVITY codelist retrieved from FMR using its SDMX REST API.

References

FMR product page

<https://www.sdmx.io/tools/fmr/>

BIS Open Tech initiative

https://www.bis.org/innovation/bis_open_tech_sdmx.htm

FMR on Docker Hub

<https://www.sdmx.io/resources/containers/fmr-docker-mysql/>

FMR Java web app download

<https://www.sdmx.io/resources/download/fmr/>

FMR Wiki – general reference

<https://fmrwiki.sdmxcloud.org/>

Data Validation Cookbook

<http://data-cleaning.github.io/validate/>

Questions

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